

U.S. Patent Appln. No. 10/552,111
Amendment
Reply to Office Action dated May 9, 2008

Docket No. 304-848

REMARKS

The foregoing amendments and these remarks are in response to the Office Action dated May 9, 2008. This amendment is timely filed.

At the time of the Office Action, claims 1-20 were pending in the application. In the Office Action, claims 2, 4-14, 16 and 20 were rejected under 35 U.S.C. §112, second paragraph. Claims 1-20 were rejected under 35 U.S.C. §103(a). The rejections are discussed in more detail below.

I. Claim Rejections under 35 U.S.C. §112

Claims 2, 4-14, 16 and 20 were rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Appropriate amendments are made herein, and Applicant respectfully requests that this rejection be withdrawn by the Examiner.

II. Rejections based upon Art

Claims 1-20 were rejected under 35 U.S.C. §103(a) as being unpatentable over German Patent No. 3314718 to Knoll (hereafter "*Knoll*") in view of U.S. Patent No. 6,135,681 to Nuzzi et al. (hereafter "*Nuzzi*").

Knoll was cited in the German search report. The German Examiner considered this document only as a document describing the general technical background of the application, and this document was not cited at all in the International search report prepared for the PCT application from which the present US application is derived. Applicant similarly believes that this document does not destroy patentability of the present claims.

In the assessment of *Knoll*, the Office Action states that figures 2a and 2b show a single-lip drill having a cutting edge 40 and an adjacent forming/breaking groove 38. It is further stated that *Knoll* does not appear to give any explicit details about the groove.

Applicant respectfully submits that the Office Action is incorrect with respect to the element designated with reference numeral 38. The element with reference numeral 38 is a chip

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surface adjacent to the cutting edge 40. *Knoll* gives more details about the geometry of this chip surface in the first paragraph of page 17. The first sentence of this paragraph roughly translates as follows:

"Also in the embodiment according to Fig. 2 the drill head 31 is provided at its free end with planer, relatively inclined surfaces 35, 36, 37 and, in addition, with a chip surface 38, which lies in the longitudinal center plane (Langsmittlebene) of the head and forms, together with the surfaces 36 and 37, cutting edges 39 and 40."

An English language machine translation of *Knoll* is attached hereto, which was provided by the esp@cenet service of the European Patent Office. The paragraph corresponding to the first paragraph of page 17 is given in bold letters.

Therefore, it is clear from the explicit disclosure of this document that chip surface (rake face) 38 is a planer surface which forms a 0° rake angle. In this respect, this prior art basically corresponds to the prior art discussed in paragraph [008] of the present specification.

Nuzzi is concerned with a cutting insert to be placed into a tool holder, and not with a single-lip drill. It is believed that *Nuzzi* is not relevant prior art at least for this reason, nor can it be combined with *Knoll* to arrive at the presently claimed subject matter.

Furthermore, the Office Action refers to columns 6, lines 40 to 51 and Fig. 8 of *Nuzzi*, and claims that the positive rake angle 80 helps to form the chips, and that the U-shaped groove aids in breaking the chips. Applicant believes that this is not a correct assessment of the document. The cited section explicitly teaches that, if desired, each of the surfaces 56 and 58 can be provided with chip breakers 82 to facilitate the reduction and the size of and removal of chips created in the drilling process. Therefore, there is no disclosure that the rake angle 80 aids in breaking the chips.

With regard to the combination of *Knoll* with *Nuzzi*, the Office Action states (beginning in the last line of page 2) that it is considered to have been obvious to have provided *Knoll* with the U-shaped groove having a positive rake angle as taught by *Nuzzi* in order to greatly facilitate the formation and breakage (column 6, line 43 of *Nuzzi*)

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This alleged motivation cannot be given by this document because, as stated above, *Nuzzi* does not teach that the groove 75 is provided to break chips. Instead, additional elements, namely the chip breakers 82, are provided to facilitate chip breakage.

In summary, it is believed that the claims directed at the single-lip drill are all patentable because independent claim 1 is patentable.

With regard to the method claims, the Office Action does not give any reason why independent claim 15 is regarded as unpatentable, and does not cite any prior art disclosing a method for the manufacturing of single-lip drills.

The background and advantages of the claimed method for manufacturing relative to the prior art are discussed in detail in the application e.g. in paragraphs [025] to [030] and [047] *et seq.*, particularly [051]. It should be noted that firstly the shaping of the drill head is completed, and that the application of the functional coating is performed after finishing the shaping processes. This ensures that at least the chip former is also provided with the functional coating. In contrast, conventional methods known to the inventors at the time of filing proceeded in a different way. In those methods (addressed in paragraph [026]) the coating step was completed and thereafter the chip former was ground into the coated drill head so that any coating on the chip former would have been ground away such that the chip former in the finished drill would not be coated. Claim 15 has been amended to clarify that the order of steps is as presented, that is, that the functional coating is applied after the chip former has been applied.

For the foregoing reasons, independent claims 1 and 15 are believed to relate to patentable subject matter, and to be in condition for allowance. The dependent claims are believed allowable because of their dependence upon an allowable base claim, and because of the further features recited.

III. Conclusion

Applicants have made every effort to present claims which distinguish over the prior art, and it is thus believed that all claims are in condition for allowance. Nevertheless, Applicants invite the Examiner to call the undersigned if it is believed that a telephonic interview would expedite the prosecution of the application to an allowance. In view of the foregoing remarks,

{WP509057.1}

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Applicants respectfully request reconsideration and prompt allowance of the pending claims.

Respectfully submitted,



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Machine Translation of DE 3314718**Result Page**

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Tiefbohrwerkzeug und Verfahren zu

its < RTI ID=5.1> Herstellung< /RTI> The invention goes out from a deep drilling tool with drill head and a shank set to it, with < RTI ID=5.2> m< /RTI> < RTI ID=5.3> lohr< /RTI> head and/or shank one in axial direction continuous depression to the discharge of drilling splinters exhibit.

Furthermore the invention goes out from a method to < RTI ID=6.1> Jer< /RTI> position one < RTI ID=6.2> Tiefbohrwerkzeuges< /RTI> the mentioned type, with which the shank is provided with a depression.

< RTI ID=6.3> in< /RTI> such deep drilling tool is from the DE-PS 26 20 430 known.

With < RTI ID=6.4> Tiefbohrwerkzeugen< /RTI> a significant problem consists of providing for a sufficient cooling of the cutting surfaces and a sufficient removal of the drilling splinters. With < RTI ID=6.5> einsatz< /RTI> of < RTI ID=6.6> Piefbohrwerkzeugen< /RTI> the conventional is enough < RTI ID=6.7> Nufuhr< /RTI> of cool and Schmierflüssigkeit not out, as it becomes inserted with normal twist drills.

It is known to provide the drill head and/or that the drill head supporting shank with one in axial direction continuous depression over which the chips discharged becomes.

With the known deep drilling tools, for example that from the document initially specified, the depression consists of an angular bead, which becomes in ranges of the shank by the fact manufactured that, on the basis of a tubular semi-finished material with a corresponding kantenförmigen pressing or roll tool the bead is imprinted.

The known < RTI ID=6.8> Diefbohrwerkzeuge< /RTI> point therefore to < RTI ID=6.9> (~; runde< /RTI> the depression an axial notch up.

Since drilling tools are particularly high mechanical loads exposed, it is through < required, them; RTI ID=7.1> Wärmebehand< /RTI> lung to hard. With a such heat treatment however stresses in the material of the workpiece which can be hardened arise. With the known < RTI ID=7.2> Tiefbohrwerkzeugen< /RTI> results in < RTI ID=7.3> si< /RTI> therefore the disadvantage that tears in the range can occur to that the bottom of the bead formed notch, so that < RTI ID=7.4> BohrwerkzeugU, < /RTI> was not up to to the loads arising in the operation.

In addition with the bead the provided rejects itself < RTI ID=7.5> Rohrmute < /RTI> rial with the hard one relatively strong, so that it is not or only possible with difficulties, the tubing < RTI ID=7.6> car < /RTI> to arrange matisch.

The chips windings removed from the drill head in the bore hole < RTI ID=7.7> sich.< /RTI>

as well known helical up, whereby the free ends of the splinter spirals particularly light can hook themselves. With the known < RTI ID=7.8> Tiefbohrwerkzeugen< /RTI> with angular bead the risk therefore exists that such splinter spirals with their free ends in the bottom of the bead settle, so that the removal of the drilling splinters hindered can become or interrupted becomes. Also this is in the practical operation of a such deep drilling tool a significant disadvantage.

Finally the bead in circumferential direction of drill head and shank can take only a limited dinkel for firmness reasons. With angular beads therefore the splinter development area standing for the order is < by; RTI ID=7.9> erge < /RTI> benden sector of a circle limited. This space can however < RTI ID=7.10> manchen< /RTI> Applications, in particular with particularly deep < RTI ID=7.11> 'sohr-< /RTI> holes and prolonged material, < RTI ID=7.12> nnzureichend< /RTI> < RTI ID=7.13> , ein.< /RTI>

< RTI ID=8.1> i'2 rfindung< /RTI> in contrast to this the object is the basis, < RTI ID=8.2> Tiefbohrwerkzeug< /RTI> to train further that initially mentioned type going by that it < with particularly high Fertigungsquali; RTI ID=8.3> tät< /RTI> made will can and that a large splinter development area is available.

This object becomes according to invention, on the basis of the deep drilling tool initially specified, by the fact dissolved that the depression in the drill head and/or shank in a cross-section area rounded located transverse to the axial direction runs.

On the basis of a method to the production one < RTI ID=8.4> 'nief < /RTI> drilling tool of the mentioned type, with which the shank is provided with a depression, those becomes the invention underlying object beyond that according to invention by the fact dissolved that the shank becomes from a tubular semi-finished material by rolling up or pulling the same manufactured.

According to invention planned the rounded cross-section area transverse to the axial direction has the significant advantage that with the hard one of the tool no increased Kerbspannungen in the range of the bottom of the depression arises. Also the tubing twists itself with the heat treatment only little, so that it is light possible to arrange the tubing automatic. After arranging the tubing is < to; RTI ID=8.5> erstel < /RTI> lung the drill cut to length. Further the erfindungsge sets < RTI ID=8.6> müsste< /RTI> rounded cross-section area < RTI ID=8.7> abzuführenden< /RTI> No against resistance, especially no edges arise to drilling splinters, at which the free ends of the splinter spirals could get caught. Finally opens < RTI ID=8.8> erfindungsgemäss< /RTI> intended rounded cross section curses the Möglichkeit, with a certain opening angle for the depression a larger splinter development area, standing for the order, < RTI ID=9.1> bereilu < /RTI> place.

In a preferred embodiment of the invention sowoh drill head is < like also shank; RTI ID=9.2> Tiefbohrwerkzeuges< /RTI> with a rounded cross-section area of the depression, those provide aligning with one another. Since the drill head exhibits a larger Durchmesser than the shank, with one < RTI ID=9.3> nichtfluchtenden< /RTI> Surfaces a transition edge in < RTI ID=9.4> nrenzberelch< /RTI> Arise to drilling head shank. Aligned surfaces however are free of such edges, so that the splinter spirals cannot hook themselves also in this place.

In other preferred embodiment of the invention the depression is an arcuate Eindellung. < RTI ID=9.5> ine< /RTI> < RTI ID=9.6> derflirtig< /RTI> Eindellung can become with

the shank with conventional tools, for example by rolling up or by pulling, particularly simple manufactured.

< RTI ID=9.7> A19< /RTI> particularly favourable proved thereby a moulding, with which in the cross-section area the center < RTI ID=9.8> Eindellung< /RTI> with their edge points, i.e. the intersections < RTI ID=9.9> - < /RTI> with the periphery of shank and/or. Drill head, an angle of approximately < RTI ID=9.10> 120 < /RTI> forms; this is the so called opening angles.

The drill head is further preferred with several, zuer: provide more inner inclined front surfaces, as < on; RTI ID=9.11> oich< /RTI> known is. So is also possible, the drill head in < RTI ID=9.12> case of planar: 3< /RTI> to provide at known manner with preferably several continuous axial bores, who flow into the interior of the shank manufactured from tubing.

In the letztgenannten case it is particularly favourably, to that interior of the shank means for transmitting from liquid to the drill head and < to the depression means for deriving from liquid and; RTI ID=10.1> Bohrspänen< /RTI> to attach. Then Kühl-und Schmierflüssigkeit becomes particularly rapid the cutting edges of the drill head carried and the splinter removal made particularly effective over the depression in the drill head and shank.

With an embodiment of the invention, which is more usable independent of the described above invention, whereby the deep drilling tool exhibits an head, which exhibits a channel located in its interior, who < with the interior; RTI ID=10.2> Schafts< /RTI> in connection is located, and whereby the head from the outside < at least one to the interior longitudinal recess and in its longitudinal direction a longitudinal, to; RTI ID=10.3> Späneabfuhr< /RTI> serving Eindellung exhibits, is provided that the recess essentially flows into those cylindrical outer surface of the head, and that of the delta of the recess itself a groove in the direction of the bit to extended, which has a distance (in circumferential direction) of the Eindellung.

Contrary to the known drill, with which with the interior of the shank into connection standing recesses at the front end of the drill head flow, i.e. at that flat ones, which forms the cutting edges and more or less transverse to the drill longitudinal direction runs, is here < RTI ID=11.1> ~, Ilindunr< /RTI> vorgee to the recess in a distance of the bit. Thus a weakening in the range is < RTI ID=11.2> gumption < /RTI> partly, in particular the apex, with which < RTI ID=11.3> uarus< /RTI> resultant danger of fracture avoided. By < RTI ID=11.4> fut< /RTI> during the drilling work as well as one < RTI ID=11.5> wandung< /RTI> the bore hole a channel provided, by whom the cooling liquid arrives forward toward to the bit. < RTI ID=11.6> Vorzugsweise< /RTI> the groove up to the drill bit runs, more exactly up to described the above essentially transverse to < RTI ID=11.7> Bohrerlangsrich < /RTI> tung longitudinal surfaces of the drill head.

The advantage of this invention lies in the fact that on the one hand becomes effected by the cooling liquid a very effective lubrication of the cutting edges of the drill and also essentially the cylindrical part of the drill head and present guide strips. The drilling splinters are through < RTI ID=11.8> dis< /RTI> Eindellung discharged. With this drill thus an internal cooling agent supply is present in that range, which is connected with the shank, against what within the range of the cutting part of the drilling head the cooling agent of aussan at the drilling head arrives.

With a Ausführungsform of the invention additional, preferably in the vicinity of the bit, is a connection with the interior of the shank in connection standing channel of the drill head and/or the groove with the Eindellung provided. Thereby a component current of the Kiihlflüssigkeit in the proximity of the drill bit arrives directly into the Eindellung,

without with the cutting edges contact to have had before. Thereby a certain suction can become generated, which contributes to the effective removal of the drilling splinters.

With the invention it is more other from advantage that by the groove in the drill head and the wall face the included < RTI ID=12.1> Kiihlflüssigkeit, < /RTI> those is zugeführt a bottom suitable pressure, an hydrostatic storage of the drill head to cause can, so that thereby frictional forces and wear very greatly reduced to become to be able. Around this to more bottom < RTI ID=12.2> support, < /RTI> at least two grooves from each other arranged in the distance are provided with a Ausführungsform of the invention, and it is the light distance between the grooves, which essentially run in longitudinal direction of the drill, among themselves large, preferably about twice as large like the distance that the Eindellung adjacent grooves of < RTI ID=12.3> Edge of the Eindellung. Es supplied here thus à each Nut< /RTI> to their two sides one about < RTI ID=12.4> leichbreiten< /RTI> Strip of the essentially cylindrical wall of the drilling head with Kiihlflüssigkeit, which < with the pressure of the pump promoting the Kiihlflüssigkeit into the gap between the cylindrical part of the drill head and; RTI ID=13.1> Bohrlochwandu< /RTI> pressed becomes and thus the above hydrostatic storage forms.

With a Ausführungsform of the invention the Aussenfläc of the head with exception of the Eindellung and the slots is cylindricl kreil. With conventional single-lip drills the head is exact generally not circular cylindrical, but are < by slight sanding of one off ursprünglic circular cylindrical form along generatrices; RTI ID=13.2> sogenannte< /RTI> Slats provided, with which the drill head rests against the edge of the wall face. With conventional drill < RTI ID=13.3> Sil< /RTI> the slats depending upon use different arranged, these drill < RTI ID=13.4> für< /RTI> various < RTI ID=13.5> Verwendungszweck< /RTI> wise different < RTI ID=13.6> sogenannte< /RTI> < RTI ID=13.7> Umfangsfonen< /RTI> up. Opposite the design of a drill head with two grooves very versatile, described in the embodiment, is more usable.

Other features and advantages of the invention result from the subsequent description of < RTI ID=13.8> Ausführungsbeispiele< /RTI> len the invention on the basis the design, which < RTI ID=13.9> Invention < /RTI> essential details shows, and from that < RTI ID=13.10> Ansprechen.< /RTI>

The single features can do single ever < RTI ID=13.11> filr< /RTI> or to several in arbitrary combination with one < itself; RTI ID=13.12> Out i iihrrulgs < /RTI> form of the invention realized its. Show Fig. 1a and 1b a low drilling tool after the conditions that Technology in perspective view as well as in a sectional view of the Shank; Fig. < RTI ID=14.1> 2s< /RTI> and 2b a first remark example one it would find in accordance with-eat low drilling tool in by spektivischer representation as well as in < RTI ID=14.2> Schnittdarstellung< /RTI> the shank; Fig. 3 one opposite Fig. perspektivische representation increased 2 < RTI ID=14.3> Schneidbereichs< /RTI> the drill after < RTI ID=14.4> i? industrial union. -2; < /RTI> Fig. 4 a side view second < RTI ID=14.5> Ausführ< /RTI> rungsbeispiels one < RTI ID=14.6> Tiefbohrwerkzeugs< /RTI> in

Viewing direction of the Pfeis IV in Fig. 6; Fig. 5 a cross section by the drill head the corresponding line V-V in Fig. 4; < RTI ID=14.7> F. < /RTI> 6 a cross section by the drill head entsprchend the line VI-VI in Fig. 4; Fig. 7 a cross section by the drill head the corresponding line < RTI ID=14.8> Vit VII< /RTI> in Fig. 4.

Fig. 1 shows a known deep drilling tool, which becomes 10 designated in the technical language also as single-lip drills.

The drill 10 < RTI ID=15.1> verfügt< /RTI> < RTI ID=15.2> liber< /RTI> an head 11 as well as one connected shank 12 dart. The shank 12 again runs out its Hülse not represented by the head 11 opposite end in, in the fig.

The shank 12 is provided with a bead 13 and the head 11 with a bead 14. < RTI ID=15.3> Die< /RTI> one from Fig. 2 erkennt, is the bead 13 of the shank 12 (just as the bead 14 < RTI ID=15.4> de.< /RTI>

Head 11) angular formed, < RTI ID=15.5> D. h.< /RTI> at the bottom of the bead 13 a notch arises.

The head 11 is at its free end with several planar: Surfaces 15, 16, 17, 18 provided, those < to each other; RTI ID=15.6> gewinkel< /RTI> run. The surfaces 15 to 18 form surface of the head 11 with the extent and/or. the planar interfaces of the bead 14 cutting edges 19, 20.

The head 11 is < in axial direction with drillings 22, 23; RTI ID=15.7> versehen7< /RTI> either, as the bore 22, entirely in a surface 16 < RTI ID=15.8> münden< /RTI> or, as < RTI ID=15.9> die< /RTI> < RTI ID=15.10> Bore @@< /RTI> in < RTI ID=15.11> Range of the cutting edge of two surfaces 16, it > , IV.< /RTI>

As one in Fig. 1b recognizes, consists the shank 12 of an hollow profile, with which a wall 24 encloses an interior 25.

One closes one therefore to the interior 25 of the shank 12 at of the head 11 the opposite end < RTI ID=16.1> Flüssigkeitspumpe< /RTI> on, the cool and/or. Diluted soluble oil promotes, arrives these < RTI ID=16.2> Flüssig< /RTI> keit by the interior 25 and the drillings 22, 23 into the range of the cutting edges 19 to 21. The chips taken off are drug along and < by the current; RTI ID=16.3> über< /RTI> the beads 14, 13 from the bore hole promoted.

Like one significant in Fig. 1 recognizes, has the drill head 11 a larger outer diameter than the shank 12. In < RTI ID=16.4> Übergangsbereich< /RTI> the beads 13, 14 develops therefore < RTI ID=16.5> uebergang< /RTI> 26 in shape of an edge.

By the beads 13, the 14 formed, along longitudinal notch as well as the edge formed by the transition 26 are therefore discontinuities, at which splinter spirals < itself; RTI ID=16.6> festhaken< /RTI> can.

< RTI ID=16.7> Bei< /RTI> In Fig. a single-lip drill 30 is represented 2 and 3 represented execution form of a drilling tool according to invention, had a head the 31 as well as a shank 32. In the Gegenaatz to the beads 13, 14 of the known drill in accordance with Fig. 1 are in Fig. 2 Eindellungen 33, 34 in the shank 32 and/or. Head 31 provided, those, like one particularly good in Fig. 2b recognizes, a rounded course has.

Also with the embodiment < RTI ID=17.1> gemäß< /RTI> < RTI ID=17.2> Fig.< /RTI> 2 is < RTI ID=17.3> Bohrkopf< /RTI> 31 at its free end with planar, to each other inclined surfaces 35, 36, 37 provides, in addition with a rake face 38, which lies and < in the longitudinal center plane of the head; RTI ID=17.4> zusam< /RTI> men with the surfaces 36 and 37 cutting edges 39 and 40 form. Between the rake 38 and the hollow surface 34 the Eindellung develops a stage 41, which < as; RTI ID=17.5> Spanleitstufe< /RTI> with prolonged material the machine cutting procedure favored.

Also the drill head 31 provided with axial longitudinal bores 42, 43 is, who flow into an interior 45, which is enclosed by a wall 44 of the shank 32.

The Eindellungen 33, 34 of shank 32 and < RTI ID=17.6> Copf< /RTI> 31 < RTI ID=17.7> fctn< /RTI> in axial direction. It develops therefore in the range < RTI ID=17.8> Übergan< /RTI> ges 46 no edge, so that to it also none < itself; RTI ID=17.9> Spann< /RTI> to hook can. As one sees easy, the Findellun forms no notch

towards 33, 34 also, so that with < itself; RTI ID=17.10> Wärmebe < /RTI> action of the single-lip drill no tears to adjust know.

As one from Fig. 1b sees, has the there bead 13, which < an angle; RTI ID=17.11> P< /RTI> 1 (opening angle) includes, the crosswise < RTI ID=17.12> schnittsfläche< /RTI> a sector of a circle. In contrast to this the Eindellung has 33 in accordance with Fig. 2 the shape of the cross-section area of two circles. Defined one one an angle < RTI ID=17.13> P< /RTI> 2 in < RTI ID=17.14> Uig.< /RTI>

2b, that by the center of the Eindellung 33 and the edge points, i.e. < RTI ID=17.15> Schnittpunkte< /RTI> from Eindellung < RTI ID=17.16> 33< /RTI> and outer peripheral surface of the shank 32 formed becomes, and assumes one that 9 2 equally large is as Q 1, follows, there! 3 by the Eindellung 33 formed the splinter development area around in < RTI ID=18.1> [. < /RTI> < RTI ID=18.2> ; i< /RTI> < RTI ID=18.3> mit< /RTI> 47 < RTI ID=18.4> b#zeic} #neten< /RTI> Surface portions larger is < as the corresponding; RTI ID=18.5> um< /RTI> the well-known drill < RTI ID=18.6> gemass< /RTI> < RTI ID=18.7> Fi.< /RTI> Ib.

In a practical embodiment the angle had < RTI ID=18.8> 'e; e< /RTI> < RTI ID=18.9> Gr < b'sse< /RTI> of 1200, whereby this however under any circumstances restrictive is not to be understood. The angle < RTI ID=18.10> Cp< /RTI> 2 can do naturally < RTI ID=18.11> äe< /RTI> after present case of application corresponding adjusted becomes.

Into the Fig. a shank 12, that exhibits 4 to 7 single-lip drills shown 60 is just as trained as the shank 12 the Fig. 1. Instead however also favourably the shank 32 the Fig can. 2 < RTI ID=18.12> for den< /RTI> Single-lip drills 60 used become. At the shank 12 a drill head or an head is 64 fixed by brazing. This exhibits 66 remote and the shank 12 directed end region a cross section in its bit, like it Fig.

5 shows. Here an interior is 68 provided, which aligns with the interior 25 of the shank 12. This interior 68 of the head 64 stands by a recess 70 with rectangular cross section, which is more other in front in a range, with the outside of the head 64 within the range of their cylindrical outer surface 72 in connection. By this recess 70 < RTI ID=18.13> hindurchgeföhrt< /RTI> Section is in Fig. 6 shown. The recess 70 < RTI ID=18.14> mündet< /RTI> also in into the surface 72 introduced, and itself in longitudinal direction of the drill extending groove 74, which runs forward on from the recess 70 up to the front end of the head 64.

The drill head points still other from the outside into the interior 68 < RTI ID=19.1> föhrende< /RTI> Recess 76 up, likewise with one of this recess 76 out after < itself; RTI ID=19.2> vorn< /RTI> up to the end of the drill extending groove 78 in < RTI ID=19.3> Verbindung< /RTI> stands. The recess 76 is only in Fig. 6 more visible, the associated groove 78 is both in Fig. 6 and in Fig. 7 more visible. The interior 68 runs in < RTI ID=19.4> Ausföhungs.< /RTI>

example only up to that the bit 66 < RTI ID=19.5> zuxe < /RTI> turned boundary surface 80 of the interior 68. That other in front longitudinal section VII VII, which < approximately on more half; RTI ID=19.6> Län< /RTI> the drill head 64 laid it is, shows that this range of the drill head 64 exhibits no more interior. < RTI ID=19.7> Ilter< /RTI> only the grooves 74 and 78 longitudinal up to the front end of the drill head are more visible.

The surface 72 of the head 64 and their by the grooves of 74 un 78 formed portions 72', 72'' and < RTI ID=19.8> 72'' < /RTI> the parts of an exact are < RTI ID=19.9> Kreiszylinr'. erfläche.< /RTI>

The grooves 74 and 78 have a different width, like it the Fig. 6 and 7 shows. The width of the two dellung of the 14, in their form with an angle of the two the Eindellung limiting the even surfaces 82 and 83 of < RTI ID=19.10> 1200< /RTI> to conventional single-lip drills, benachbar ten ranges has altogether a width corresponds 72 ' and 72 " ' of the cylindrical outer surface of the head 64 (< in; RTI ID=19.11> Umfangsrich'& It; /RTI> < RTI ID=19.12> tung< /RTI> measured), the width of the range < RTI ID=19.13> 72 " < /RTI> < RTI ID=19.14> angenehme: < /RTI> corresponds. It can do therefore that bottom pressure the interior < RTI ID=19.15> 2< /RTI> < RTI ID=19.16> zugeführte< /RTI> Coolant if the drill head < itself; RTI ID=19.17> er4< /RTI> < RTI ID=19.18> it< /RTI> Inner one < RTI ID=19.19> Bohrloch< /RTI> rules, in the extremely small spaces between the ranges 72 ', < RTI ID=19.20> 72 " < /RTI> and < RTI ID=19.21> 72 ' < /RTI> and the wall face a sufficient uniform pressure develop, which < one; RTI ID=19.22> hydrostatische< /RTI> < RTI ID=19.23> La; erling< /RTI> < RTI ID=19.24> Kopr< /RTI> 64 with corresponding low friction effected.

In < RTI ID=20.1> Ausführungsbeispiel< /RTI> the Fig. it concerns 4 to 7 a drill with 10 mm diameters. The length of the head 64 starts wedge shaped June located of the bit 64 up to that somewhat right beside the cutting plane V-V < RTI ID=20.2> gung, < /RTI> to the purpose of soldering provided is, amounts to about 29 mm. The surface 80 of the recess 70 has a distance of approximately 19 mm from the bit. The length of the recess 70 (measured in drill longitudinal direction) amounts to 5 mm, their width amounts to about 2 mm. The length of the grooves 74 and 78 amounts to about 18 mm. The smallest wall thickness of the head 64 in Fig. 5 about 1.5 mm, the largest width of the interior 68 (radial measured) amount to amount to in Fig. 5 about 2.5 mm. The width < RTI ID=20.3> Xut< /RTI> 74 about 4 mm, the width of the groove 78 amount to amount to about 2.5 mm. It understands itself that the indicated mass with drill, which is certain for other borehole diameters corresponding adapted to become to have.

The recesses 70 and 76 should be, how in the embodiment shown is, to if possible dense because of the shank 12, as far as this for firmness reasons possible is, so that the head 64 on one < if possible long length by; RTI ID=20.4> Kühlflüs < /RTI> sigkeit lubricated becomes. That the rear recesses 70 and 76 located range of the surface 72 must be however so prolonged that an escape of the cooling liquid is opposite good prevented sufficient for drilling direction.

The head 11, 31 and/or. 64 of cemented carbide sintered consists and is. The Eindellungen 14, 34, the recesses 70, 76, the grooves 74, 78 and the interior 68 < RTI ID=20.5> (Fig.< /RTI> 3) as well as the drillings 22, 23 and 42, 43 are manufactured before sintering.